



DACQ

Dynasty Academic Competition

Questions

September 2007
Study Guide:
ets of the Solar System

Mercury:

Volume (in Earths): 0.054 Eccentricity: 0.205 Albedo: 0.119

Mercury is the first planet from the Sun, and as such it has the shortest year. Under current classifications Mercury is the smallest of the planets, and is notable for being studied by only one probe, Mariner 10. It is generally believed to have significantly large iron core, and in fact has the largest ratio of iron of any planet, perhaps due to a prior collision stripping off much of Mercury's surface and leaving only its interior. Its core also likely accounts for its minor magnetic field. Notable features of Mercury include the Caloris Planitia, the Discovery Rupes, and the Skinakas Basin.

Venus:

Volume (in Earths): 0.857 Eccentricity: 0.0068 Albedo: 0.65

Venus is the second planet from the Sun, and resembles Earth significantly in its structural composition. Venus's orbit has the smallest eccentricity of all the planets – its orbit is almost circular. Venus is most famous for its tumultuous atmosphere, which consists chiefly of carbon dioxide with some nitrogen. This atmosphere combines with Venus's clouds of sulfuric acid and sulfur dioxide to create a devastating greenhouse effect, superheating the surface. Venus has “false ice caps” created by the atmosphere which may consist of lead sulfide. Venus's surface features two elevated plains, Ishtar Terra and Aphrodite Terra. Other key features include Maxwell Montes, Venus's highest peak, Lakshmi Planum, Alpha Regio, and Beta Regio.

Mars:

Volume (in Earths): 0.151 Eccentricity: 0.0934 Albedo: 0.15

Fourth from the Sun, Mars is notable for its polar ice caps which have long fueled speculation about water once existing on the planet. Mars has two moons, Phobos and Deimos, named for the sons of Ares in Greek myth and discovered by Asaph Hall. Most of the Martian surface consists of basalt covered by an iron oxide powder. Mars is home to Olympus Mons, the solar system's largest mountain and volcano, and Valles Marineris, the solar system's largest valley. Other features include the volcano Alba Patera and the Hellas and Argyre impact basins.

Jupiter:

Volume (in Earths): 1321 Eccentricity: 0.0488 Albedo: 0.343

Jupiter, the fifth planet from the Sun, is the first of the gas giants (Jupiter, Saturn, Uranus, Neptune), as well as the largest planet in the solar system. Jupiter's atmosphere is about nine parts hydrogen and one part helium, and eddy currents from the planet generate a massive magnetic field. Jupiter's best-known feature is the Great Red Spot, a swirling anticyclone located around the South Equatorial Belt. Jupiter's huge mass has led it to amass countless asteroids around its Lagrangian points, bodies known as Trojans. Jupiter's four Galilean moons were named by Simon Marius for various love interests of Jupiter (Zeus) in classical mythology. Io, the innermost moon, is tremendously volcanically active, due in large part to Jupiter's magnetic field which steadily strips atoms away from the moon. Its best-known feature is the crater Loki Patera. Europa, the next moon, is an extremely smooth body with the highest albedo of solar system satellites. It possesses an icy surface crisscrossed by lineae, prominent dark lines, and has few craters, though prominent areas of geological upheaval exist, such as the Conamara Chaos. Astronomers theorize that life may exist in a subterranean ocean on the moon. Ganymede, the third moon, is known for the contrast of its dark and light surface portions, the largest of which is the dark plateau Galileo Regio. Surface areas are generally named for Egyptian or Sumerian mythological figures, including the prominent Gilgamesh crater. It is the largest moon in the Solar system. The final moon, Callisto, may be the most heavily cratered object in the solar system –

craters so dominate the surface that few other features have a chance to form. Most “surface features” are really just varying arrangements of craters: “Cluster craters” dominate the surface, including the largest two, Valhalla and Asgard, while Catanae like Gomul Catena are large lateral rings of craters.

Saturn:

Volume (in Earths): 763.6 Eccentricity: 0.0561 Albedo: 0.342

Saturn, the sixth planet from the Sun, is a gas giant noted for its prominent rings. Saturn's structure is similar to Jupiter's, though it features a prominent layer of metallic hydrogen. Its pole possesses a hexagonal cloud pattern and planetary features include the Great White Spot. Saturn's rings are simply a collection of water ice and dust, which were first sighted by Galileo and identified by Christian Huygens. Rings are categorized as A, B, C, or D rings, and feature divisions such as the Colombo, Keeler, and Maxwell gaps and the Encke and Cassini divisions. Saturn, like Jupiter, is a large planet with several prominent moons, most notably Iapetus, Rhea, Phoebe, Dione, Mimas, Tethys, Enceladus, and Titan. Titan is famed for its nitrogen, methane, and ethane atmosphere and hydrocarbon seas, which may create an environment capable of supporting life. Titan's surface also features the high-reflective plain Xanadu.

Uranus:

Volume (in Earths): 63.09 Eccentricity: 0.044 Albedo: 0.300

Discovered in 1781 by William Herschel, Uranus is the seventh planet from the Sun. Its atmosphere, the coldest in the solar system, is made up of hydrogen, helium, nitrogen, ammonia, and methane. Uranus has sizable rings, though they are not as prominent as Saturn's, and is tilted almost sideways on its axis. Uranus's somewhat irregular orbit also led to the discovery of Neptune, since Neptune's gravity interfered with Uranus path. The planet also possess a somewhat unique “corkscrew” magnetic tail. All moons of Uranus are named for characters created by William Shakespeare or those created by Alexander Pope, with the most famous being Oberon, Titania, Ariel, Umbriel, and Miranda.

Neptune:

Volume (in Earths): 57.74 Eccentricity: 0.011 Albedo: 0.290

Neptune, the most distant planet from the Sun, was also the last to be discovered, having been done so through mathematical prediction rather than direct observation. While Urbain Le Verrier did all of the calculations, his partner Johann Galle and rival John Couch Adams are usually co-credited with the planet's discovery. Its atmosphere is mostly hydrogen and helium, though bands of methane exist which absorb red light and provide Neptune with its prominent blue color. Its atmosphere has the fastest winds in the solar system, and was home to the Great Dark Spot, theorized to have been a gap in the atmosphere which disappeared 1989 and 1994. Two large storm systems also exist, and are usually referred to as the Wizard's Eye and the Scooter. Neptune's major satellite is Triton, discovered in 1846 by William Lassell. Triton is usually considered to be a captured Kuiper Belt object due to its unusual structure. It is usually described as possessing a “cantaloupe” surface, a reference to the sulci grooves created by the same geological activity that causes the moon's intense cryovolcanism.

Honorable Mention: Pluto

Volume (in Earths): 0.007 Eccentricity: 0.2488 Albedo: 0.49-.066

Pluto had a pretty rough year in 2006, being reclassified as a “dwarf planet” with Ceres and Eris. Even worse, Pluto isn't even the largest dwarf planet (that honor goes to Eris). Pluto's eccentric orbit does, however, occasionally bring it closer to the Sun than Neptune. Pluto is often erroneously said to have been discovered as a result of mathematical prediction, though in reality the planet was merely accidentally discovered by Clyde Tombaugh at Lowell Observatory as part of a search for a larger “planet X.” Pluto is mostly rock and ice and has a thin atmosphere of nitrogen, methane, and carbon dioxide. Pluto also has a “moon” (often described as part of a double dwarf planet system with Pluto) called Charon as a reference to discoverer James Christy's wife, as well as the smaller moons Nix and Hydra.

